| Sl24 | PxIRenE3-24 |
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Advanced Wind Power Forecasting

**Have to maintain**

**Python Programming:** Utilize Python for data analysis, model development, and simulation, leveraging libraries such as Pandas, NumPy, Scikit-learn, TensorFlow, and Keras.

**Machine Learning and Statistical Models:** Develop and compare different forecasting models, including traditional statistical methods (e.g., ARIMA) and advanced machine learning techniques (e.g., LSTM, Random Forest).

**Real-time Data Analysis:** Incorporate real-time data streams to enhance the forecasting accuracy and adaptability of the models.

**Simulation and Validation:** Conduct extensive simulations to test and validate the models under various scenarios and conditions.

**Data Collection**

1.Sources of wind power data (e.g., meteorological stations, wind farms)

(Search it online or create according to maintain the topic structure )

2.Data preprocessing techniques

**Model Development**

1.Selection of machine learning algorithms (e.g., ARIMA, LSTM, Random Forest)

2.Simulation setup using Python

**Model Training and Validation**

1.Training process and parameter tuning

2.Validation techniques and performance metrics

**Implementation**

1.Python-based simulation environment setup

2.Integration of libraries and tools (e.g., Pandas, NumPy, Scikit-learn, TensorFlow)

3.Step-by-step guide to model development and simulation

**Results and Discussion**

1.Analysis of forecasting accuracy and reliability

2.Impact of different algorithms and data preprocessing techniques

3.Limitations and potential improvements